

NEW SPECIES OF ASTERACEAE-HELIANTHEAE FROM LATIN AMERICA

Jose L. Panero
Department of Botany
University of Texas
Austin, Texas 78713

José Luis Villaseñor and Rosalinda Medina
Departamento de Botánica
Instituto de Biología
Universidad Nacional Autónoma de México
Apartado Postal 70-367
04510 México, D.F., Mexico

The active exploration of several regions of Mexico by personnel of the National Herbarium of Mexico and our field trips, during which we concentrated on collecting members of the Asteraceae, have resulted in the discovery of nine of the eleven new species described herein.

Two of the new species belong to the genus *Oteiza*, which was previously known only from two rare, seldom collected species. The morphology and generic affinities of *Oteiza* are discussed. The new species are described as outlined in Panero (1992).

Coreopsis davila Panero & Villaseñor, sp. nov.—TYPE: MEXICO. Puebla: Summit of Cerro Tepoxtla Grande (a peak of the Filo de La Tierra Colorada range) just NW of the village of San Martín de Esperilla and S of Chacnopalan, 2650 m, 1 Nov 1991, *Panero, Dávila & Tenorio 2590* (holotype: MEXU!; isotypes: ENCB! MEXU! MICH! TENN! TEX! UC! US!). Fig. 1.

A *C. petrophiloide* inflorescentiis minoribus, capitulis majoribus, et habitu humili frutescenti differt.

Small shrubs 20–40 cm tall; stems terete, herbaceous parts glabrous or with a few moniliform trichomes, woody parts gray. Leaves opposite, pinnately veined; blades 1.5–5 cm long, 1.2–4 cm wide, smaller distally towards the capitulescence, rhombic in outline with two or three lobes at each side of the blade, the lowermost lobe larger and longer than the distal ones, adaxial surface glabrescent, green, abaxial surface glabrescent, creamy green, margins deeply dentate, apex acute to acuminate, base attenuate; petiole 0.6–2.5 cm long. Capitulescence a solitary head or of 3 heads arranged in a simple dichasium; peduncles 4–8 cm long, trichomes like those of the stems, purple-green. Heads heterogamous, radiate, hemispheric, 1–1.3 cm high, 1.4–1.8 cm wide (excluding ligules); receptacle 5.5–6 mm wide, flat. Phyllaries 20–26 in 4 graduated series; phyllaries of first and second series 4.5–6 mm long, 1–1.8 mm wide, appressed, herbaceous, lanceolate to linear, glabrous, green; phyllaries of third and fourth series 7–8.5 mm long, 4–4.5 mm wide, appressed, chartaceous, obovate to oblong, glabrescent, brown-orange with numerous black resin canals in the central portion of the phyllary, rimmed with yellow. Pales 6.3–6.8 mm long, 2–2.4 mm wide, oblong, shallowly conduplicate, not keeled, glabrescent, same color as innermost phyllaries, apex

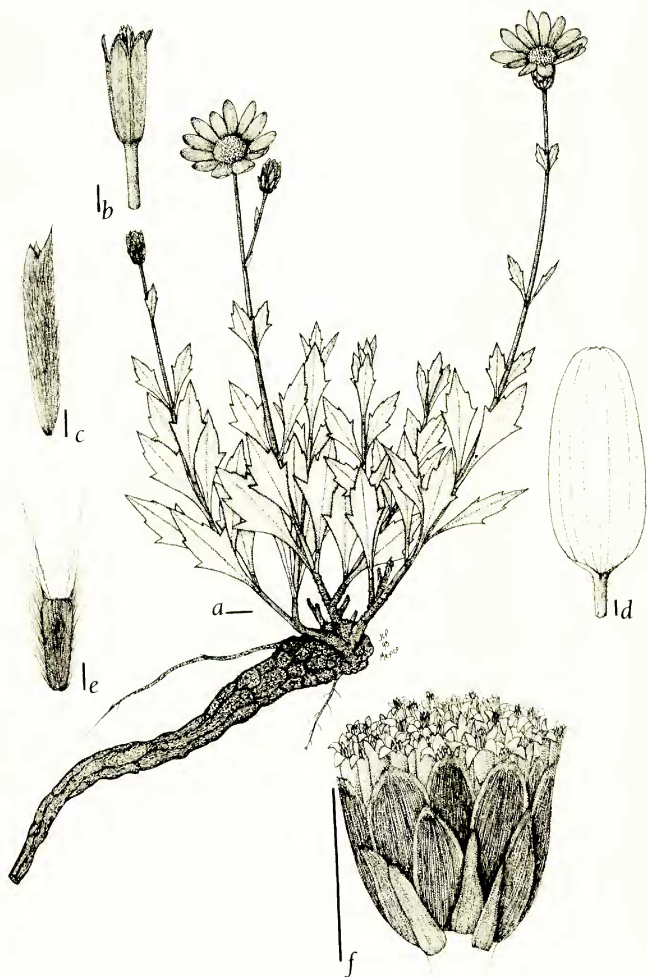


FIG. 1. *Coreopsis davilae* (Panero, Dávila & Tenorio 2590). a. Habit. b. Disk corolla. c. Pale. d. Ray corolla. e. Disk achene. f. Head (ligules not shown). (a, f, bar = 1 cm; b-e, bar = 1 mm.)

truncate. Ray flowers 11–15, corollas yellow-orange; ligule 1.4–2 cm long, 7–7.5 mm wide, oval, glabrous, veins on abaxial surface blackish, apex bifid, rounded; tube 2.2–2.5 mm long, sparsely puberulent, greenish yellow. Ray ovary 3.9–4.2 mm long, oblong to obovate, densely sericeous on edges, epappose. Disk flowers 45–65, hermaphrodite, corollas campanulate, yellow-orange with black resin canals running lengthwise along each side of the veins; throat 2.8–3 mm long, essentially glabrous; tube 2 mm long, glabrescent, greenish yellow; lobes 1–1.4 mm, deltate, glabrescent, yellow-orange rimmed with black resin canals; anthers 1.9–2.2 mm long, brown-black, appendages 0.6 mm long, oval to suborbicular; styles 4.5–5 mm long, yellow-orange with two black resin canals running lengthwise the style and abaxial surface of style branches, style branches 1.2–1.4 mm long, acute. Disk achene (immature) 3.2–3.5 mm long, 1–1.5 mm wide, oblong, densely sericeous on edges and central area of achene; pappus of two prominent awns 4.1 mm long. Chromosome number unknown.

Coreopsis davilae is known only from gypsum outcrops of the summits of Cerro Tepoxtla Grande and nearby Cerro Tres Encinos (or Tres Mogotes). At the type locality, the species is rare but at Cerro Tres Encinos it is abundant, growing in the crevices of rocks with *Coreopsis parvifolia* Blake, *Tridax palmeri* A. Gray, *Nolina* sp., and shrubby oaks.

Coreopsis davilae shares with *C. petrophiloides* B. L. Rob. & Greenm. of western Mexico a similar leaf shape and head morphology, although the heads of *C. davilae* are nearly twice as large as those of *C. petrophiloides*. The capitulescence structure is also helpful in distinguishing both species; *C. davilae* has a solitary head or a simple dichasium (3 heads), whereas *C. petrophiloides* typically has a monochasial thyrse of 6–30+ heads. Another distinguishing characteristic is habit; *C. davilae* is a low shrub no more than 40 cm tall, whereas *C. petrophiloides* is normally a taller and denser shrub 0.8–1.5 m tall.

The species name honors our good friend Dra. Patricia Dávila, chair of the Botany Department, U.N.A.M. Her interest in the area of Tehuacán is responsible for the successful project Flora of Tehuacán, which will result in a Flora for this botanically exciting area. Her desire to know and understand the vegetation of every corner of the valley of Tehuacán took us to the botanically unexplored Filo de La Tierra Colorada range, where we found this novelty and the beautiful *Viguiera davilae* (see below).

Oteiza mixtecana Villaseñor & Panero, sp. nov.—TYPE: MEXICO. Oaxaca: Mpio. Tamazulapan, Cerro Pericón al NW de San Pedro Nopala, 2660 m, Tenorio, Dávila & Panero 18024 (holotype: MEXU!; isotype: MICH!). Fig. 2.

A *O. acuminata* capitulis minoribus, inflorescentiis majoribus congestioribusque, et foliis minoribus differt.

Perennial herbs 40–80 cm tall; stems terete, glabrous to sparsely puberulent, purple. Leaves opposite, triplinerved; blades 2–5.5 cm long, 0.7–2.5 cm wide, smaller distally towards the capitulescence, ovate, adaxial surface sparsely scabrous, shiny green, abaxial surface sparsely strigose, creamy green, margins entire to shallowly serrulate, sometimes with 4–7 mucros at each side of the blade, apex acuminate, base obtuse; petiole 1–4 mm long. Capitulescence of 9–25+ heads, dichasial-thyrse; peduncles 4–5 mm long, densely puberulent, greenish white. Heads heterogamous, radiate, narrowly campanulate to tubular, 1–1.2 cm high, 3–5 mm wide (excluding ligules); receptacle 1 mm long, 1 mm wide, conical. Phyllaries 9–13 in 4 graduated



FIG. 2. *Oteiza mixtecana*, *O. scandens*, and *Schistocarpha pedicellata*. a-f. *Oteiza mixtecana* (Tenorio, Dávila & Panero 18024). a-f. a. Flowering branch. b. Disk corolla. c. Pale. d. Ray corolla. e. Disk achene. f. Head (ligules not shown). g-n. *Oteiza scandens* (Panero & Campos 2745). g. Flowering branch. h. Disk corolla. i. Outermost pale. j. Innermost pale. k. Ray corolla. l. Disk achene (immature). m. Disk achene (mature). n. Head (ligules not shown). o. *Schistocarpha pedicellata* (Panero & Campos 2752). o. Disk achene. (a, f, g, n, bar = 1 cm; b-e, h-m, o, bar = 1 mm.)

series, phyllaries of all series essentially identical in morphology differing only in size, 1.5–6.5 mm long, 1–2.5 mm wide, appressed, chartaceous to indurate, lanceolate to oblong, glabrescent, stramineous-green, distal 1/3 to 1/5 of phyllary herbaceous, appressed, green. Pales 5–6 mm long, 0.8–1.5 mm wide, narrowly oblong, flat not conduplicate, glabrescent, stramineous-green, apex rounded to acute. Ray flowers 5–6, pistillate, corollas yellow-white to greenish white; ligule 5.5–6 mm long, 3–4 mm wide, oval, glabrous, veins on abaxial surface somewhat greenish, apex conspicuously trifid, truncate; tube 2.5 mm long, sparsely puberulent, greenish yellow; style 4.2–4.5 mm long, style branches 0.5–0.6 mm long, acute without appendage. Ray achene 2 mm long, obconical, glabrous, black; pappus of 17–26 awns or bristles of different lengths, 1.8–2.7 mm long, stramineous, caducous, the pappus arising from a ring smaller in circumference than the top of the achene. Disk flowers 8–13, hermaphrodite, protruding 4–5 mm beyond pales, corollas campanulate, yellow-green with orange resin canals running lengthwise along each side of the veins and splitting at the lobe sinus with 5 additional resin canals running lengthwise the throat from the tip of the lobes down to the junction of the throat and the tube; throat 3.8–4.2 mm long, 0.5–0.7 mm wide at base, 1.2 mm wide at top, essentially glabrous; tube 1.6–1.9 mm long, moderately puberulent, greenish yellow; lobes 1.5 mm long, deltate, glabrous abaxially; anthers 1.4–1.6 mm long, yellow-green, appendages 0.5 mm long, lanceolate, yellow; styles 5.5 mm long, yellow, style branches 0.5–0.7 mm long, acute, without appendages. Disk achene like ray achene. Chromosome number unknown.

ADDITIONAL SPECIMENS EXAMINED. **Mexico.** OAXACA: Mpio. Tamazulapan, Cerro Pericón, al NW de San Pedro Nopala, 2400–2600 m, 21 Oct 1984, *Tenorio et al.* 7863 (MEXU); Mpio. San Pedro Topiltepec, Santa María Tilttepec, 2420 m, 4 Oct 1990, *Cruz* 264 (TEX).

Oteiza mixtecana is a rare species of the dry oak and pine-oak forest of Cerro Pericón of northwestern Oaxaca. The mountain range where the type collection was gathered has been totally deforested and most of the topsoil has been eroded, so the survival of *O. mixtecana* in this area is doubtful. Given the scattered individuals of *Erythrina* L. and *Furcraea* Vent. that dot the barren hills, *O. mixtecana* must have grown in a distinctive oak forest. Other unusual and rare species of Asteraceae found in the area are: *Tridax luisana* Brandegee, *Acourtia tenoriensis* B. Turner, *Senecio purpusii* Brandegee, and *Coreopsis oaxacensis* B. Turner.

Oteiza mixtecana shares with *O. acuminata* La Llave of central Mexico a similar disk and ray corolla color, conical receptacles, a caducous pappus of multiple awns borne on a ring, large nectaries (especially evident in young flowers just before anthesis), and a graduated involucre composed of mostly chartaceous, imbricate phyllaries. The major difference between the two species is the size and arrangement of the heads, which in *O. acuminata* are approximately two to three times larger than those of *O. mixtecana*. The capitulescence of *O. mixtecana* is composed of numerous, tightly packed heads, whereas in *O. acuminata* the heads are borne in longer peduncles and the capitulescence is normally smaller ranging from 3 to 18 heads. The larger leaves of *O. mixtecana* are half as large as those of *O. acuminata*. The relationship of these two species to the other two members of the genus is discussed below.

Oteiza scandens Panero & Villaseñor, sp. nov.—TYPE: MEXICO, Oaxaca: Km 134.5 of the road Oaxaca–Puerto Angel, 2450 m, 16 Feb 1992, *Panero & Alvaro*

Campos 2745 (holotype: MEXU!; isotypes: ENCB! K! MA! MEXU!
MICH! MY! TENN! TEX! UC! US!).

Fig. 2.

A. O. ruacophila capitulis majoribus hemisphaericis et inflorescentiis folisque majoribus differt.

Scandent shrubs or vines 1–8 m long; stems terete with a few striations, herbaceous parts sparsely puberulent, purplish green, woody parts gray. Leaves opposite, triplinerved; blades 9.5–13 cm long, 6.5–10 cm wide, smaller distally towards the capitulescence, ovate, adaxial surface sparsely scabrous to strigose, green, abaxial surface essentially glabrous, slightly lighter in color than adaxial surface, margins serrulate, the tip of each serration terminated by a prominent mucro, apex acuminate, base obtuse and cuneately narrowed into petiole; petiole 3–6 cm long. Capitulescence of 9–60+ heads, dichasial-thyrsoïd; peduncles 5–15 mm long, sparsely puberulent, green. Heads heterogamous, radiate, hemispherical, 1–1.3 cm high, 0.8–1 cm wide (excluding ligules); receptacle 2 mm long, 2 mm wide, conical. Phyllaries 18–24 in 3 graduated series; phyllaries of first series 3.8–5 mm long, 2–3 mm wide, appressed, indurate, ovate, glabrescent, stramineous-green, distal 1/2 to 1/3 of phyllary herbaceous, appressed, green; phyllaries of second series 7–8 mm long, 2–2.5 mm wide, appressed, chartaceous to slightly indurate, ovate to lanceolate, glabrescent, stramineous-green, distal 1/5 of phyllary herbaceous, appressed, green; phyllaries of third series 0.8–1 cm long, 1.5–1.8 mm wide, appressed, indurate with essentially no herbaceous apex, stramineous-green, glabrous, narrowly lanceolate to linear. Pales 6 mm long, 1–1.5 mm wide, outermost pales narrowly oblong, innermost pales deeply trilobed or acicular, flat not conduplicate, glabrescent, stramineous-green, apex rounded to acute. Ray flowers 10–15, pistillate, corollas white; ligule 1–1.2 cm long, 4–6 mm wide, oval to oblong, glabrous, veins on abaxial surface somewhat purplish white, apex conspicuously trifid, truncate; tube 4–4.5 mm long, sparsely puberulent, greenish yellow; style 5 mm long, style branches 0.8–1 mm long, acute without appendage. Ray achene 1.5–2.5 mm long, obconical, glabrous, black; pappus of 16–30 awns or bristles of different lengths, 0.8–3.5 mm long, stramineous, caducous, the pappus arising from a ring smaller in circumference than the top of the achene. Disk flowers 40–60, hermaphrodite, protruding 4–5 mm beyond pales, corollas narrowly campanulate to tubular, yellow with orange resin canals running lengthwise along each side of the veins and splitting at the lobe sinus, with 5 additional resin canals running lengthwise from the tip of the lobes down to the junction of the throat and the tube; throat 5 mm long, 0.8–1 mm wide at base, 1.2 mm wide at top, essentially glabrous; tube 2 mm long, moderately puberulent, greenish yellow; lobes 0.6–0.8 mm long, deltate, moderately puberulent abaxially; anthers 1.6–2 mm long, yellow-green, appendages 0.5 mm long, lanceolate, yellow; styles 5 mm long, yellow, style branches 1 mm long, acute, without appendages. Disk achene like ray achene. Chromosome number: $n = 17$.

Oteiza scandens is known only from the type collection. The species is very conspicuous because of its scandent habit and numerous heads with large white ligules and bright yellow disk flowers, reminiscent of scandent individuals of *Montanoa atriplicifolia* (Pers.) Sch.-Bip. It grows in rich, mesic cloud forest of the Sierra de Miahuatlán, a part of the Sierra Madre del Sur of Oaxaca. The type locality is dominated by trees of *Alnus* Mill., *Carpinus* L., *Ulmus* L., *Cheiranthodendron* Kuntze, and *Buddleia* L. among many others. As is true of many of the other species here described, the habitat of *O. scandens* has been destroyed, and only a few plants remain at the type locality.

Oteiza scandens shares with *O. ruacophila* (Donn. Smith) Fay a similar scandent habit, a conical receptacle, large white ligules, a distinctive graduated involucre of mostly chartaceous phyllaries, and obconical achenes with a pappus of caducous awns. *Oteiza scandens* differs from *O. ruacophila* by its larger, hemispherical heads (campanulate in *O. ruacophila*), larger leaves, and oblong to trilobed pales (narrowly lanceolate to acicular in *O. ruacophila*).

With the two species of *Oteiza* described in this paper, the total number of species recognized in the genus grows to four. Within *Oteiza*, two clear lineages can be identified based on gross morphology and habitat preference. *Oteiza acuminata* and *O. mixtecana* are perennial herbs from dry oak or xerophytic forests, and have greenish yellow ray corollas and narrowly campanulate heads; *O. ruacophila* and *O. scandens* are vines in cloud forest or mesic oak forest, and have white ray corollas and campanulate to hemispherical heads. The four species share conical receptacles, caducous pappi of multiple awns, and highly graduated involucre composed of mostly chartaceous phyllaries. This combination of characters is not found in any of the purportedly related genera of *Oteiza*.

Oteiza has been traditionally allied to *Perymenium* Schrad. because of their superficially similar achene pappus morphology and duration. *Oteiza* differs from *Perymenium*, however, on several notable characteristics, namely, yellow anthers, conical receptacles, and achenes that are obconical and not compressed as in *Perymenium*.

The achene and ray corolla morphology of *Oteiza* is typical of subtribe Galinoginae (sensu Robinson 1981). Based on disk flower microcharacters and head morphology, the genus has been recently allied to *Schistocarpha* Less. by Robinson (1979). *Oteiza* and more specifically its white ligule species resemble, albeit superficially, some species of *Schistocarpha* because of their graduated involucre with chartaceous phyllaries and pappus. The two genera can be easily separated by the disk achene pappus, which in *Oteiza* is composed of multiple caducous awns of different size that rarely exceed the base of the disk corolla throat. *Schistocarpha*, however, has a pappus of somewhat caducous awns or bristles that are mostly equal in length and normally are as long or slightly longer than the throat. Another important difference between the two genera is the apical morphology of the achene, more specifically, where the pappus is inserted. In *Oteiza* the pappus is borne from a ring which becomes less evident as the achene matures and plumps up, whereas in *Schistocarpha* the pappus is borne from a somewhat similar ring which, however, is as wide as the apical diameter of the achene and is made more evident by the conspicuous constriction of the achene immediately below the pappus.

Oteiza might be confused with *Alepidocline* S. F. Blake (sensu stricto: *A. annua* and *A. breedlovei*) because of their similar pappus. *Oteiza* differs from *Alepidocline* in having a mostly suffruticose habit (annuals in *Alepidocline*), and paleaceous, hemispherical or campanulate heads (epaleaceous and urceolate in *Alepidocline*).

Perymenium tehucanum Villaseñor & Panero, sp. nov.—TYPE: MEXICO. Puebla: Mpio. de Totoltepec, 7 km al NW de Santa Cruz Nuevo, por el camino a San Juan Ixcaquistla, 1720 m, 21 Aug 1980, González-Medrano, Jaramillo & Villaseñor 1236 (holotype: MEXU!; isotypes: MICH! TEX!). Fig. 3.

A. P. glanduloso capitulis majoribus, pedunculis longioribus, phyllariis lanceolatis apicibus patentibus herbaceis, et foliis majoribus differt.

Small shrubs 1 m tall, stems terete, herbaceous parts sparsely hirsute with stipitate and sessile glandular trichomes, greenish brown, woody parts brown.

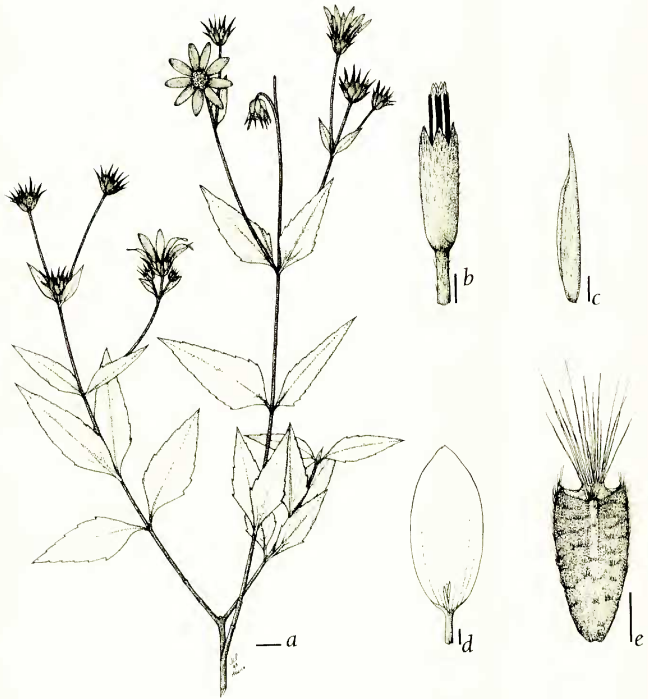


FIG. 3. *Perymenium tehuacanum* (Medrano, Jaramillo & Villaseñor 1236). a. Flowering branch. b. Disk corolla. c. Pale. d. Ray corolla. e. Disk achene. (a, bar = 1 cm; b-e, bar = 1 mm.)

Leaves opposite, triplinerved; blades 2-5.5 cm long, 0.6-2.5 cm wide, smaller distally towards the capitulescence, ovate, adaxial surface sparsely scabrous with stipitate glandular trichomes, light green, abaxial surface sparsely strigose with sessile and stipitate glandular trichomes, creamy green, margins dentate to entire, apex acuminate, base obtuse to attenuate; petiole 0.2-1 cm long. Capitulescence of 3-18 heads, dichasial-thyrsoïd; peduncles 0.8-5 cm long, light green. Heads heterogamous, radiate, broadly campanulate, 0.8-1.4 cm high, 0.7-1 cm wide (excluding ligules); receptacle 4-5 mm wide, flat. Phyllaries 14-18 in 2 to 3 subequal series; phyllaries of first series 6-8 mm long, 2.5-3 mm wide, lanceolate, basal half of phyllary indurate, appressed, minutely hirsute and glandular, stramineous, distal half of phyllary herbaceous, spreading, sometimes slightly twisted, sparsely hirsute and glandular; phyllaries of second and third series 0.8-1.4 cm long, 1.5-3 mm wide, narrowly lanceolate, pubescence and color as in first series. Pales 6.5-8.5 mm long, 1.4-1.8 mm wide, shallowly conduplicate, not keeled, glabrescent

with a few stipitate glandular trichomes, basal half stramineous, distal half and apex stramineous-yellow, apex acuminate, erect to spreading. Ray flowers 7–10, pistillate, corollas golden-yellow; ligule 1–1.2 cm long, 4.5–5.5 mm wide, oval to oblong, sparsely puberulent on abaxial surface, apex shallowly trifid, round; tube 2–2.3 mm long, sparsely puberulent, greenish yellow; style 2 mm long, yellow, style branches 1.5 mm long, acute. Ray achene 3.7–4.2 mm long, 1.8–2.2 mm wide, oblong, triquetrous, sparsely to moderately sericeous, pubescence not uniform but concentrated as tufts on achene wall protrusions, greenish black; pappus of 14–18 somewhat caducous awns of different lengths, 1.5–3.5 mm long. Disk flowers 20–27, hermaphrodite, not exceeding the pales, corollas campanulate, yellow with orange resin canals; throat ca 3 mm long, ca 1.2 mm wide at base, ca 1.5 mm wide at top, glabrescent; tube 1.4–1.5 mm long, sparsely puberulent, yellow; lobes ca 0.8 mm long, deltate, glabrous abaxially; anthers 2 mm long, black, appendages 0.5 mm long, ovate, yellow; styles 4–4.5 mm long, style branches 1.2–1.4 mm long, acuminate. Disk achene 3.4–3.7 mm long, 1.3–1.5 mm wide, ovate, biconvex to prismatic, pubescence and pappus as in ray achene. Chromosome number unknown.

Perymenium tehuacanum is known only from the type collection, gathered along intermittent river canyons of the southern basin of the valley of Tehuacán.

Perymenium tehuacanum shares with *P. glandulosum* Brandegee and *P. cornutum* Brandegee a similar glandular herbage otherwise unknown in *Perymenium* (Fay 1978). The most distinctive characteristic of *P. tehuacanum*, however, is the involucre, composed of spreading, lanceolate phyllaries, which is unique in *Perymenium*.

***Verbesina badilloi* Panero, sp. nov.**—TYPE: VENEZUELA. Mérida: 38 km S of Estanque on rd to Canaguá, 2550 m, 2 Dec 1991, *Panero, Benítez de Rojas & Badillo 2685* (holotype: MY!; isotypes: COL! MA! MER! MEXU! MICH! TENN! TEX! UC! US! VEN!).

Fig. 4.

A *V. tachirensi* capitulis majoribus, corollis florum radii discique majoribus, et floribus disci paucioribus differt.

Shrubs 3–4 m tall; stems terete, herbaceous parts densely tomentose to velutinous, pale green, woody parts light brown to gray. Leaves alternate, the larger ones asymmetrical, pinnately veined; blades 2–38 cm long, 2–16 cm wide, smaller distally towards the capitulescence, those associated with the capitulescence conspicuously smaller than the cauline leaves, elliptical, adaxial surface moderately minutely hirsute, green, abaxial surface moderately velutinous, creamy green, veins conspicuously outlined against background, sericeous, white-green, margins shallowly crenate with prominent mucros, apex acuminate, base attenuate; petiole 1–4 cm long. Capitulescence of 15–60+ heads, monochasial-thyrsoïd; peduncles 0.5–4.5 cm long, densely pubescent. Heads radiate, campanulate, 1.2–1.4 cm high, 8 mm wide (excluding ligules); receptacle 4–5 mm wide, flat. Phyllaries 4–6 in 1 series, 4–12 mm long, 2.5–5 mm wide, appressed, herbaceous, oblong, sparsely to moderately velutinous to puberulent, somewhat rugose with transversal striations especially on the base, pale green suffused with dark green areas especially on edges and striations. Pales 10–11 mm long, 3.8–5 mm wide, oblong, conduplicate, moderately puberulent, basal half of pale green, distal half dark green to black, apex acute and spreading. Ray flowers 3, corollas white, pistillate; ligule 9–11 mm long, 4–6 mm wide, oblong, moderately puberulent abaxially, apex conspicuously trifid, tube 2.2–2.5 mm long, moderately to densely puberulent; style 4–4.5 mm long,

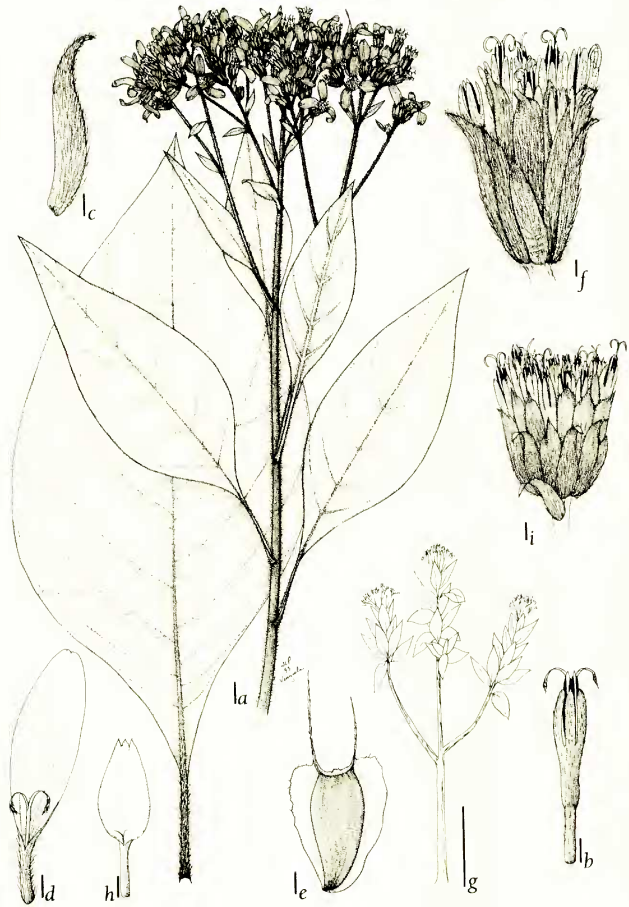


FIG. 4. *Verbesina badilloi* and *V. tachirensis*. a-g. *Verbesina badilloi* (Panero, Benítez de Rojas & Badillo 2685). a. Flowering branch. b. Disk corolla. c. Pale. d. Ray corolla. e. Disk achene. f. Head (ligules not shown). g. Habit. h, i. *Verbesina tachirensis* (Steyermark 57149). h. Disk corolla. i. Head (ligules not shown). (a, bar = 1 cm; b-f, h, i, bar = 1 mm; g, bar = 1 m.)

white; style branches 1.5–2 mm long, white. Ray achene 5.5–6 mm long, 4–4.5 mm wide (including wings), flat, obovate, glabrescent, brownish black, pappus of two awns 3–3.2 mm long. Disk flowers 12–18, corollas white and black, hermaphrodite; throat 1.8–2.2 mm long, oblageniform, moderately puberulent, distal half of throat black, basal half white; tube 1.6–2 mm long, densely puberulent, white; lobes 2.5–2.8 mm long, sparsely puberulent on abaxial surface, abaxial surface black, adaxial surface white; anthers 2–2.2 mm, black, appendages 0.6 mm long, black; style 5.5–7 mm long, white, style branches 1.5–1.8 mm long, acute with prominent appendages. Disk achene like ray achene. Chromosome number: $n = 17$.

ADDITIONAL SPECIMENS EXAMINED. **Venezuela.** MÉRIDA: Bosques densos y húmedos entre San Isidro Alto y El Molino, 2200–2400 m, 2 Dec 1972, *Badillo* 5835 (MY-3); same locality and date as type specimen, *Bentéz de Rojas et al.* 4429 (MY).

Verbesina badilloi occurs in the cloud forest of the southern escarpment of the Andean range of Mérida. Sadly, the native flora of the area has been nearly destroyed except for a few places along deep ravines, where the original vegetation, including *V. badilloi*, still persists. The survival of this species clearly depends on the conservation of these remnants of cloud forest.

Verbesina badilloi shares with *V. negrensis* Steyerl., *V. tachirensis* Steyerl., *V. laevifolia* S. F. Blake, and *V. acuminata* DC. a similar disk corolla morphology, which is unique in the genus. All these species have deeply dissected disk corolla lobes, which in some species measure up to two-thirds of the total length of the throat. *Verbesina badilloi* differs from *V. negrensis*, *V. acuminata*, and *V. laevifolia* in having broadly elliptical leaves with dull green adaxial surfaces and pubescent abaxial surfaces; the last three species have lanceolate to narrowly ovate leaves with dark greenish purple, shiny, resinous, and glabrescent adaxial surfaces and mostly glabrous abaxial surfaces. *Verbesina badilloi* shares with *V. tachirensis* a similar capitulescence structure, head and leaf morphology, and herbage pubescence. Furthermore, the two species have deeply dissected disk corollas with lobes that are black abaxially (a characteristic also shared with *V. acuminata*). *Verbesina badilloi* differs from *V. tachirensis* in having larger heads with ray and disk flowers, pales, achenes, and phyllaries that are twice as large or larger than those of *V. tachirensis*. *Verbesina badilloi* differs further from *V. tachirensis* in having more disk flowers per head and three ray flowers as opposed to four to six typical of *V. tachirensis*. In addition, the heads of *V. badilloi* are campanulate to cylindrical, whereas those of *V. tachirensis* are oblong to slightly hemispherical.

The specific epithet honors Dr. Victor Manuel Badillo, indefatigable student of the Venezuelan Flora and the family Asteraceae.

Verbesina hygrophila Panero & Villaseñor, sp. nov.—TYPE: MEXICO. Durango: 14 km E of Canelas on rd to Santiago Papasquiaro, 2180 m, 28 Aug 1991, *Panero, González & Acevedo* 2253 (holotype: MEXU!; isotypes: CIIDIR! MICH! TEX! US! UC!). Fig. 5.

A *V. synoti* inflorescentiis majoribus, phyllariis paleisque nigrescentibus, et foliis magnis ovatis vel suborbicularibus differt.

Shrubs 2–3 m tall, stems terete, herbaceous parts glabrous or glabrescent, purplish green, woody parts gray. Leaves opposite, triplinerved; blades 7–20 cm long, 2.5–13.5 cm wide, smaller distally towards the capitulescence, broadly ovate to suborbiculate, adaxial surface sparsely scabrous, green, abaxial surface velutinous, creamy green, veins outlined against background, velutinous-sericeous, white-green, margins serrulate, apex acuminate, base obtuse; petiole 3–16 cm long,



FIG. 5. *Verbesina hygrophila* and *V. papasquiara*. a-g. *Verbesina hygrophila* (Panero, González & Acevedo 2253). a. Flowering branch. b. Disk corolla. c. Pale. d. Ray corolla. e. Disk achene. f. Head (ligules not shown). g. Habit. h-n. *Verbesina papasquiara* (Panero, González & Acevedo 2264). h. Flowering branch. i. Disk corolla. j. Pale. k. Ray corolla. l. Disk achene. m. Head (ligules not shown). n. Habit. (a, h, bar = 1 cm; b-f, i-m, bar = 1 mm; g, n, bar = 1 m.)

winged. Capitulescence of 30–200+ heads, monochasial-thyrsoïd; peduncles 3–8 mm long, sparsely to moderately puberulent. Heads radiate, campanulate, 1–1.2 cm high, 0.8–1 cm wide (excluding ligules); receptacle 1–1.5 mm wide, flat. Phyllaries 8–10 in 1–2 series, 1.5–4 mm long, 0.7–1 mm wide, appressed, herbaceous, narrowly lanceolate, sparsely puberulent, dark green drying black. Pales 5.5 mm long, 2 mm wide, oblong to narrowly lanceolate, shallowly conduplicate, glabrous or sparsely puberulent, dark green drying black, apex acute, erect. Ray flowers 3–4, corollas yellow-orange, pistillate; ligule 7–8 mm long, 4.2–4.6 mm wide, oval, apex trifid, round; tube 1.5 mm long, sparsely puberulent; style 3.5 mm long, yellow; style branches 1.2–1.5 mm long, yellow. Ray achene 4.3–4.6 mm long, 2–2.4 mm wide (including wings), flat, obovate, glabrous, stramineous-green, pappus of two awns 2.4 mm long. Disk flowers 9–13, corollas yellow-orange, hermaphrodite; throat 5 mm long, narrowly campanulate, sparsely puberulent or glabrous; tube 2 mm long, glabrescent, greenish yellow; lobes 1.2–1.4 mm long, deltate, sparsely puberulent on abaxial surface; anthers 2.3–2.5 mm long, black, appendages 0.6 mm long, lanceolate, black; style 8 mm long, yellow, style branches 1.8–2.2 mm long, tapered with prominent appendages. Disk achene slightly larger than ray achene. Chromosome number: $n = 17$.

Verbesina hygrophila shares with *V. papasquiara*, *V. pauciflora* Hemsl., and *V. synotis* S. F. Blake opposite leaves, essentially glabrous stems, yellow-orange corollas, and a small number of disk flowers per head. In addition, all these species appear to be endemic to the pine-oak forest of the Sierra Madre Occidental of Durango, Sinaloa, and Chihuahua. *Verbesina hygrophila* differs from these species in having large, broadly ovate to suborbicular leaves and dark green to black phyllaries and pales; other differences among these species are summarized in the following key.

1. Leaves with entirely winged petioles, auriculate at base.
 2. Heads with 5–13 disk flowers.
 3. Phyllaries dark green drying black; blades broadly ovate to suborbicular; heads with 9–13 disk flowers. *V. hygrophila*.
 3. Phyllaries light green, drying stramineous-green; blades ovate; heads with 5–7 disk flowers. *V. synotis*.
 2. Heads with 18–25 disk flowers. *V. papasquiara*.
1. Leaves with partially winged petioles, not auriculate at base.
 4. Heads radiate, with 18–25 disk flowers. *V. papasquiara*.
 4. Heads discoid, with 7–10 disk flowers. *V. pauciflora*.

Verbesina hygrophila is known only from the type collection. The specific epithet refers to the fact that the single population found was growing along creeks in the shade of mesic pine-oak forest.

Verbesina lapazii Panero, sp. nov.—TYPE: BOLIVIA, La Paz: Prov. Nor Yungas, de Coroico 12 km hacia Coripata, 2050 m, 11 Apr 1990, Beck 17629 (holotype: US!; isotype: LPB). Fig. 6.

A *V. leucactinota* capitulis majoribus, floribus radii discique majoribus et foliis integris differt.

Shrubs 3 m tall; stems terete, noticeably nerved when dry, herbaceous parts glabrous, green, woody parts unknown. Leaves alternate, pinnately veined; blades 10–25 cm long, 3.5–10 cm wide, slightly smaller distally towards the capitulescence, ovate, adaxial surface sparsely strigose to hirsute, abaxial surface moderately hirsute to villous, especially on veins, veins creamy white to tan and clearly

outlined against green background, margins entire to shallowly crenate with regularly spaced mucros at each side of the blade (ca 1 per cm), apex acuminate, base obtuse and attenuate into winged petiole; petiole 6–8.5 cm long, winged and auriculate at base. Capitulescence of 20–200+ heads, monochasial-thyrsoïd; peduncles 0.6–1.2 cm long, sparsely puberulent, green. Heads heterogamous, radiate, campanulate, 5–5.5 mm high, ca 5 mm wide (excluding ligules), receptacle 2 mm long, flat. Phyllaries 9–12 in 2 graduated series; phyllaries of first series 1.8–2.2 mm long, 1–1.2 mm wide, appressed, mostly herbaceous, ovate, glabrescent, green; phyllaries of second series 4–4.3 mm long, 1.5–1.7 mm wide, appressed, obovate, glabrescent, basal half of phyllary stramineous, distal half green suffused with black. Pales ca 4.2 mm long, 1.5–1.8 mm wide, obovate, shallowly conduplicate, sparsely puberulent, stramineous green, distal half of pale suffused with black, apex broadly acute. Ray flowers 5–7, pistillate, corollas white; ligule 4.5–5 mm long, ca 2 mm wide, oblong, glabrescent on abaxial surface, apex trifid, round to truncate; tube 1.8–2 mm long, sparsely puberulent, greenish white; style 2 mm long, white, style branches 0.7–0.8 mm long, acute without appendage. Ray achene (immature) ca 2.5 mm long, obconical, essentially glabrous, black; pappus of two awns 2.5 mm long. Disk flowers 25–35, hermaphrodite, protruding 1–2 mm beyond pales, corollas tubular to narrowly campanulate, white; throat 1.8–2.2 mm long, 0.6 mm wide at base, 1.1 mm wide at top, sparsely puberulent, pubescence somewhat denser at base; tube 1 mm long, sparsely puberulent, greenish white; lobes 0.5 mm long, deltate, glabrous abaxially; anthers ca 1.5 mm long, black, appendages 0.2 mm long, ovate, black; styles 2 mm long, white, style branches 1.3–1.5 mm long, acute, without appendages. Disk achene like ray achene. Chromosome number unknown.

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** LA PAZ: Prov. Nor Yungas, 10.2 km SW of Yolosa on rd to Chuspipata, ca 20 km NE of Chuspipata, 5 Apr 1984, 1700 m, *Solomon & Uehling 12239* (US); Hwy La Paz-Coroico, 7.3 km from Coroico, 1800 m, 31 Mar 1977, *Boeke 1421* (US).

Verbesina lapazii shares with the white-flowered, pinnately-leaved species of *Verbesina* small heads, white corollas, large capitulescences, alternate leaves, and a perennial or weakly shrubby habit. It differs from this group of species in having entire leaves (also seen in some populations of *V. turbacensis* H. B. K., *V. quetamensis* Olsen, *V. sararensis* Cuatrec., and *V. exalata* Steyererm.). *Verbesina lapazii* might be confused with the sympatric *V. leucactinota* B. L. Rob. because of their similar, massive capitulescences. It can be easily separated from this species by several features of the head and disk corolla. In *V. lapazii* the heads are campanulate and larger than those of *V. leucactinota*. In addition, the heads of *V. lapazii* have fewer disk flowers than those of *V. leucactinota*. Another important difference between both species is the length of the disk corolla lobes, which in *V. lapazii* are half as long as those of *V. leucactinota*. The most discrete difference between the two species is the leaf blade, which in *V. lapazii* is ovate and unlobed but in *V. leucactinota* is deltate in outline and pinnately lobed. *Verbesina lapazii* may also be confused with *V. semidecurrrens* Kuntze because of its similar auriculate leaf bases. *Verbesina lapazii* is easily separated from *V. semidecurrrens* by its campanulate heads (hemispherical in *V. semidecurrrens*) with half as many disk flowers and graduated involucre with ovate to oblong, glabrescent phyllaries. In *V. semidecurrrens* the involucre is not graduated, and the phyllaries are more numerous, lanceolate, and moderately villous. In addition, the pale apex of *V. lapazii* is acute, whereas in *V. semidecurrrens* it is acuminate.

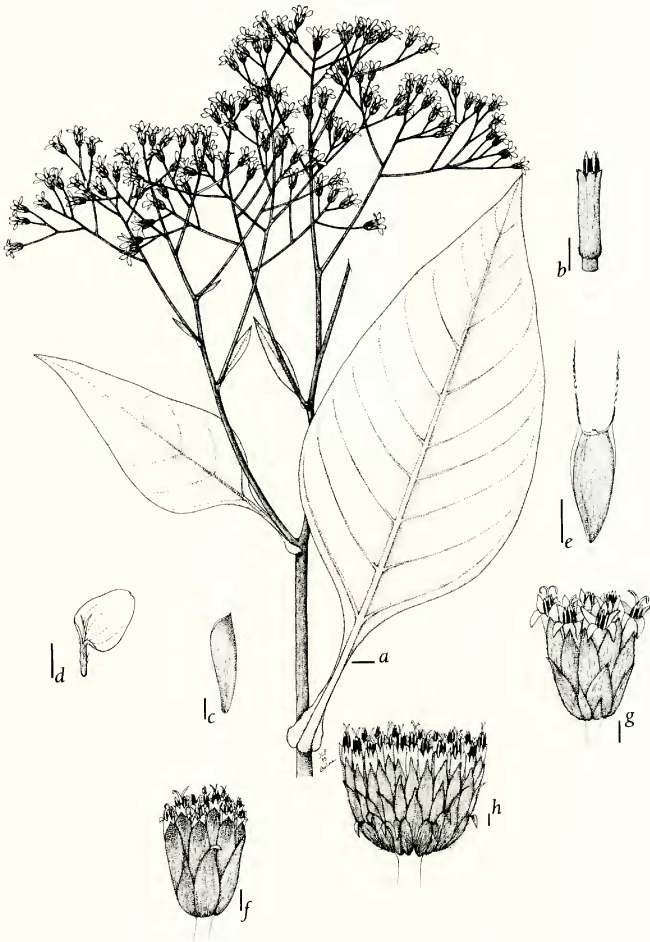


FIG. 6. *Verbesina lapazii*, *V. leuactinota*, and *V. semidecurrens*. a-f. *Verbesina lapazii* (Beck 17629). a. Flowering branch. b. Disk corolla. c. Pale. d. Ray corolla. e. Disk achene. f. Head (ligules not shown). g. *Verbesina leuactinota* (Bang 2135). g. Head (ligules not shown). h. *Verbesina semidecurrens* (García 608). h. Head (ligules not shown). (a, bar = 1 cm; b-h, bar = 1 mm.)

Verbesina papasquiara Panero & Villaseñor, sp. nov.—TYPE: MEXICO. Durango: 93 km NW of Canatlán on rd to Santiago Papasquiara, growing in disturbed *Pinus cembroides*-*Juniperus*-*Quercus* forest, 2170 m, 31 Aug 1991, Panero, González & Acevedo 2264 (holotype: MEXU!; isotypes: CIIDIR! MICH! TENN! TEX! UC! US!). Fig. 5.

A *V. synoti* capitulis majoribus, floribus disci numerosioribus, et foliis basi non auriculatis differt.

Perennial herbs 1–1.5 m tall; stems terete, glabrescent, purplish green. Leaves opposite, triplinerved; blades 3–13 cm long, 1–8 cm wide, smaller distally towards the capitulescence, ovate to deltate, adaxial surface sparsely strigose, green, abaxial surface sparsely velutinous, pubescence denser along veins, slightly paler than adaxial surface, margins serrate to dentate, apex acuminate to acute, base truncate to attenuate and cuneately narrowed into the petiole; petioles 2–5 cm long, winged along distal 4/5 of petiole, rarely entirely winged, sometimes with small auricles at base. Capitulescence of 15–50+ heads, monochasial-thyrsoid; peduncles 1–4.5 cm long, moderately puberulent to strigose, purplish green. Heads radiate, campanulate, 1.2 cm high, 7–9 mm wide (excluding ligules); receptacle 1–2 mm wide, slightly convex. Phyllaries 11–13 in two subequal series; phyllaries of first series 4.5–6 mm long, 1–2 mm wide, spatulate, spreading, basal third indurate, puberulent, yellowish green, distal two-thirds herbaceous, puberulent, green; phyllaries of second series 4.5–6.5 mm long, 1–2 mm wide, lanceolate, appressed, basal two-thirds indurate, puberulent, yellowish green, distal third herbaceous, puberulent, green. Pales 8–8.5 mm long, 2.3–2.6 mm wide, lanceolate, conduplicate, keeled, chartaceous, protruding 1.5–3 mm beyond phyllaries, stramineous, apex acute, erect. Ray flowers 5–6, pistillate; corollas yellow-orange; tube 2 mm long, sparsely puberulent; ligule 8–9 mm long, 4.5–5.5 mm wide, oval, spreading, glabrous, apex rounded, trifid. Ray achenes 6–6.5 mm long, 3–3.5 mm wide (including wings), narrowly obovate, glabrous, stramineous-green; pappus of two awns 3 mm long. Disk flowers 18–25, corollas protruding 1–3 mm beyond pales; corollas yellow-orange, campanulate; tube 1.5 mm long, stramineous-yellow, sparsely puberulent; throat 4.8–5.3 mm long, 1 mm wide at base, 1.5 mm wide distally, sparsely puberulent; lobes 0.7–1 mm long, deltate, sparsely puberulent abaxially; anthers 2.5 mm long, thecae black, appendages 0.5 mm long, orange, ovate; styles 7 mm long; style branches ca 2 mm long. Disk achenes 7–7.5 mm long, 5–5.5 mm wide (including wings), obovate, glabrous, black, wings stramineous-green; pappus of two awns 2.5–3 mm long. Chromosome number: $n = 17$.

ADDITIONAL SPECIMEN EXAMINED. **Mexico**, DURANGO: Hwy 39, 20 km SE of Santiago Papasquiara, 2 Aug 1970, Flyn 1520 (TEX).

Verbesina papasquiara is known only from collections gathered at the first mountain range of the eastern side of the Sierra Madre Occidental. The low hills of this range are covered with disturbed *Pinus cembroides*-*Juniperus*-*Quercus* forest. *Verbesina papasquiara* is abundant along an intermittent creek on the west facing slopes of these mountains.

Verbesina papasquiara shares with *V. synotis* a similar yellow-orange corolla, leaf shape, and opposite leaves. It can be easily separated from this species by its larger heads and purplish green stems (for more distinguishing characteristics, see key under *V. hygrophila*).

Verbesina reyesii Panero & Villaseñor, sp. nov.—TYPE: MEXICO. Oaxaca: Distrito de Teposcolula, Anama, 3 km SE de San Vicente Nuño, 2500 m, 25 Oct 1990, *Reyes 2683* (holotype: MEXU!; isotype: MICH!). Fig. 7.

A *V. hypoglauca* inflorescentiis minoribus, capitulis majoribus, et pappo nullo differt.

Small shrubs up to 1 m tall; stems terete, herbaceous parts puberulent, greenish white, woody parts glabrous, light brown. Leaves opposite with pinnate venation; blades 8–12.5 cm long, 3.5–5 cm wide, somewhat smaller distally towards the capitulescence, ovate to elliptical, adaxial surface sparsely hirsute to strigose, dark green, abaxial surface moderately sericeous, creamy green, veins conspicuously outlined against greenish background, sessile glandular trichomes sparsely distributed on abaxial surface, margins subentire to entire with 10–15 mucros at each side of the blade, apex acuminate, base rounded to attenuate; petiole 0.6–1 cm long. Capitulescence of 3 heads arranged in a simple dichasium; peduncles 6–9 cm long, puberulent, greenish white. Heads heterogamous, radiate, hemispheric, 1 cm high, 0.8–1 cm wide (excluding ligules); receptacle 5 mm wide, flat to slightly convex. Phyllaries 17–23 in 2–3 graduated series; phyllaries of first series 7–8 mm long, 2–2.5 mm wide, reflexed, herbaceous, foliaceous, lanceolate to oblong, pubescence like that of the leaves, green with reticulate venation, margins ciliate and slightly involuted; phyllaries of second and third series 4.5–5 mm long, 1 mm wide, appressed, herbaceous, chartaceous, oblong to lanceolate, resembling pales, sparsely puberulent, stramineous, greenish black at distal end, margins sparsely ciliate or glabrous. Pales 4.5 mm long, 0.5–0.7 mm wide, narrowly lanceolate, conduplicate, sparsely puberulent, stramineous, greenish black at distal end, apex acute. Ray flowers 7–10, corollas golden-yellow, pistillate; ligule, 1–1.2 mm long, 3.5 mm wide, oblong, moderately puberulent abaxially, veins on abaxial surface greenish black, apex conspicuously bifid; tube 1.3 mm long, sparsely puberulent. Ray achene 1.2–1.5 mm long (immature), oblong, glabrous, epappose. Disk flowers 50–70, corollas golden-yellow, hermaphrodite; throat 2 mm long, campanulate, sparsely puberulent; tube 1 mm long, moderately puberulent, greenish; lobes 0.6 mm long, sparsely puberulent on abaxial surface, yellow suffused with black especially at distal end; anthers 1.6 mm long, black, appendages 0.4 mm long, black; style 4 mm long, style branches 1.2 mm long, acute. Disk achene, 1.5 mm long (immature), oblanceolate, glabrous. Chromosome number unknown.

Verbesina reyesii shares with *V. sororia* A. Gray and *V. hypoglauca* Sch.-Bip. ex Klatt several morphological features. The three species have opposite, elliptical to ovate leaves with serrulate to entire margins and short petioles. In addition, they have sparsely to densely sericeous abaxial leaf surfaces, which give these species their characteristic light green to white abaxial leaf color. *Verbesina reyesii* can be readily distinguished from these two species by features of the involucre and capitulescence. In *V. reyesii* the involucre is graduated, and the phyllaries of the outermost series are foliose, reflexed, and exceed those of the innermost series; in *V. sororia* the involucre is not graduated, and the phyllaries of the outermost series do not exceed the innermost ones. Populations of *V. hypoglauca* from Oaxaca have involucre somewhat similar to those of *V. reyesii* in which the phyllaries of the outermost series are reflexed and longer than those of the innermost series. The phyllaries of these populations, however, are always smaller, and

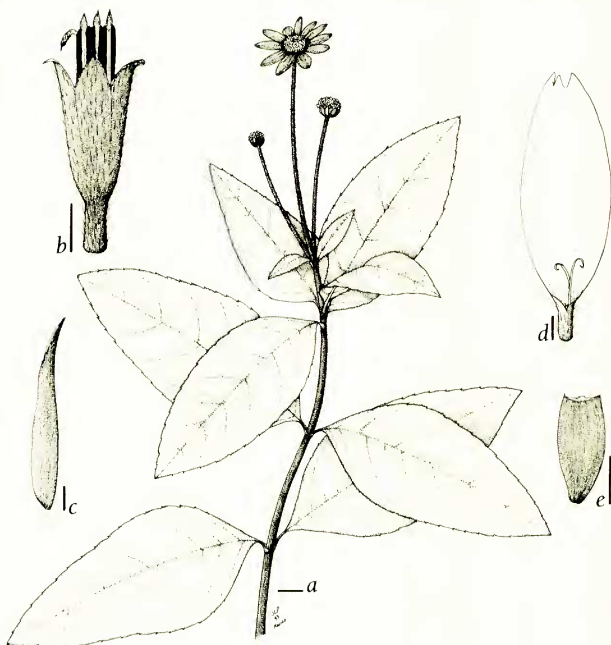


FIG. 7. *Verbesina reyesii* (Reyes 2683). a. Flowering branch. b. Disk corolla. c. Pale. d. Ray corolla. e. Disk achene. (a, bar = 1 cm; b-e, bar = 1 mm.)

not as reflexed and foliose as in *V. reyesii*. *Verbesina reyesii* can be further distinguished from the other two species by its capitulescence, which is a simple dichasium, whereas in *V. sororia* and *V. hypoglauca* the capitulescence is dichasial-thyrsoid with 12 to 50 heads. The achenes of *V. reyesii* are epappose, but pappose in *V. sororia* and *V. hypoglauca*.

The species epithet honors its collector, Jerónimo Reyes, a student at the Jardín Botánico, U.N.A.M., investigating the biogeographical and floristic affinities of the Flora of northwestern Oaxaca.

Verbesina strotheri Panero & Villaseñor, sp. nov.—TYPE: MEXICO. Chiapas: Mts WSW of San Cristóbal de Las Casas, along trail to San Lucas, approximately 200 m W of sewage tunnel entrance, 2100 m, Panero & Salinas 2526 (holotype: MEXU!; isotypes: CAS! COL! ENCB! K! MA! MEXU! MICH! MY! QCA! RSA! SI! TENN! TEX! UC! US!). Fig. 8.

A *V. klattii* capitulis minoribus, floribus radii discique paucioribus, phyllariis majoribus, et foliis minoribus differt.

Shrubs 1–3 m tall; stems terete, herbaceous parts puberulent, purplish green, woody parts glabrous and brown-canescens. Leaves opposite, triplinerved; petiole 1.5–6 cm long, slightly canaliculate, winged along distal 2/3; blades 4.5–13 cm long, 2.5–10 cm wide, slightly smaller distally towards the capitulescence, ovate to broadly ovate, some leaves shallowly palmate, adaxial surface sparsely to moderately strigose, pale green, abaxial surface sparsely to moderately hirsute, stramineous pubescence denser on veins, effectively outlining them against green background, margins serrate to double-serrate, apex acuminate to acute, base truncate to obtuse and attenuate along petiole. Capitulescence of 3–25 heads, of simple dichasia or dichasial-thyrsoïd; peduncles 0.5–5 cm long, moderately to densely puberulent, grayish purple. Heads heterogamous, radiate, hemispheric to campanulate, 1.2–2 cm high, 0.8–1.4 cm wide (excluding ligules); receptacle 0.5–0.8 cm wide, flat to slightly convex. Phyllaries 21–27 in 3–4 subequal series; phyllaries of first and second series 1–1.5 cm long, 0.8–1.2 cm wide, spreading, herbaceous, foliiform, somewhat bullate, suborbicular, light green drying dark green or black, sparsely puberulent; phyllaries of second and third series 1–1.2 cm long, 0.4–0.6 mm wide, appressed, chartaceous to scarious, lanceolate, sparsely puberulent or glabrous, distal half dark green drying black, margins glabrous. Pales 0.9–1.2 cm long, 0.25–0.35 mm wide, lanceolate, conduplicate, glabrous, stramineous, distal half dark green or blackish green, apex acute to acuminate. Ray flowers 5–7, corollas pale yellow, pistillate; ligules 1–1.5 cm long, 0.6–0.7 cm wide, ovate to elliptical, sparsely puberulent on veins of abaxial surface, apex trifid; tube 3 mm long, essentially glabrous. Ray achene 5 mm long, 3 mm wide including wings, flat to slightly biconvex, sometimes 3-angled, glabrous, grayish stramineous, pappus of two minute awns 0.3–0.5 mm long. Disk flowers 35–55, corollas pale yellow, hermaphrodite; throat 5 mm long, tubular to narrowly campanulate, sparsely puberulent; tube 3.5 mm long, glabrous; lobes 1 mm long; anthers 3.0–3.3 mm long, black, appendages 0.5 mm long, black; styles 7–8 mm long, style branches 1.5–2 mm long, acute. Disk achenes resembling ray achenes, 6–8 mm long, 4.5–5 mm wide, pappus like that of ray achene. Chromosome number: $n = 17$.

ADDITIONAL SPECIMENS EXAMINED. **Mexico**, CHIAPAS: Around San Juan Chamula, 4 Nov 1987, *Santiz Ruiz 323* (CAS); Salida Tunel, 4–7 km W of San Cristóbal de Las Casas, 2100 m, 16 Oct 1980, *Breedlove & Strother 46337* (CAS), 46352 (CAS), 28 Oct 1981, *Breedlove 56000* (CAS).

Verbesina strotheri has only been collected from the low mountains surrounding the city of San Cristóbal de Las Casas. The area is dominated by moist oak and pine-oak forests with a well-developed shrub stratum. Interestingly, *V. strotheri* occurs only on the northern slopes of one of these hills and around the town of Chamula. The survival of this species is doubtful because of population pressures that are already evident at the base of these mountains.

Verbesina strotheri with its broad suborbicular phyllaries, opposite leaves, and light yellow corollas clearly belongs in section *Alatipes*, as outlined by Robinson and Greenman (1899). This species represents the southernmost extension of the group and the only member of the section in Chiapas. *Verbesina strotheri* is remarkable within the section because of its large suborbicular phyllaries and small number of ray flowers. It shares with *V. klattii* B. L. Rob. & Greenm. of western Mexico light yellow corollas and a somewhat similar phyllary morphology, although the heads of *V. klattii* are much larger and hemispherical. In addition, *Verbesina strotheri* has wingless stems, whereas *V. klattii* has winged stems.

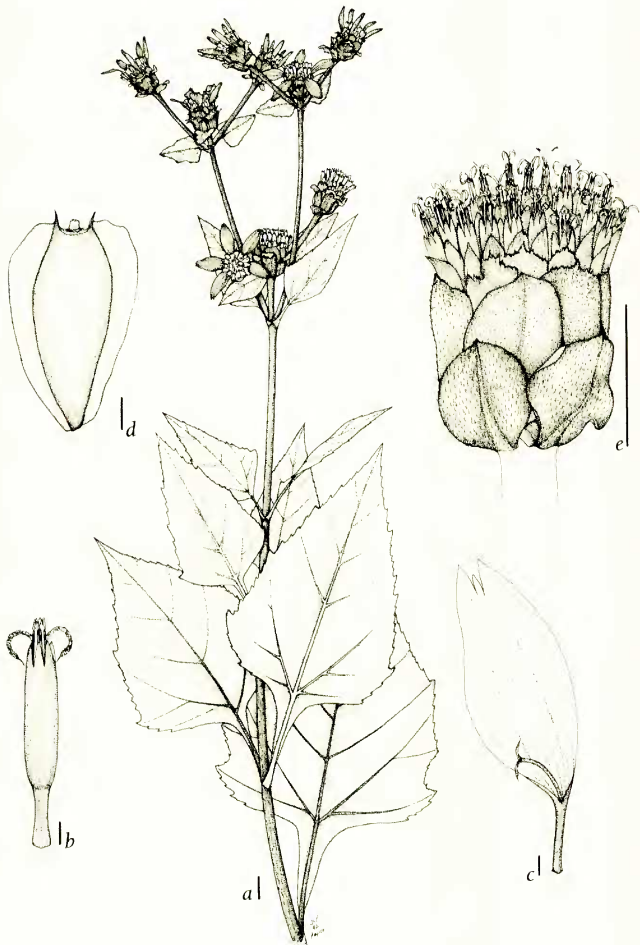


FIG. 8. *Verbesina strotheri* (Panero & Salinas 2526). a. Flowering branch. b. Disk corolla. c. Ray corolla. d. Disk achene. e. Head (ligules not shown). (a, e, bar = 1 cm; b-d, bar = 1 mm.)

The specific epithet honors John L. Strother, Curator of the Herbarium, University of California, Berkeley, who called to our attention this remarkable species.

Viguiera davilae Panero & Villaseñor, sp. nov.—TYPE: MEXICO. Puebla: Summit of Cerro Tepoxtla Grande (a peak of the Filo de La Tierra Colorada range) just NW of the village of San Martín de Esperilla and S of Chacnopalan, 2650 m, 1 Nov 1991, *Panero, Dávila & Tenorio 2581* (holotype: MEXU!; isotypes: ENCB! MEXU! MICH! TENN! TEX! UC! US!). Fig. 9.

A *V. bombycina* habitu stolonifero, phyllariis lanceolatis appressis, et acheniis pappo instructis differt.

Stoloniferous herbs becoming weak shrubs with age, 0.5–1.8 m tall; stems terete, herbaceous parts sparsely strigose to velutinous, greenish purple, woody parts glabrous, gray. Leaves opposite, triplinerved; blades 2.5–11 cm long, 0.8–3.8 cm wide, smaller distally towards the capitulescence, lanceolate, lowermost leaves trilobed, adaxial surface moderately to densely hirsute, grayish green, abaxial surface moderately to densely sericeous, bluish green, abaxial surface of lowermost leaves turning glabrous and pale green with age, margins entire to shallowly serrate, involute, apex acute to acuminate, base obtuse to attenuate along petiole; petiole 0.8–2 cm long. Capitulescence of 1–9 heads, simple monochasial cyme to monochasial-thyrsoïd; peduncles 7–12 cm long, sparsely to moderately strigose to velutinous. Heads radiate, hemispherical, 1.2–1.5 cm high, 1.5–2.5 cm wide (excluding ligules); receptacle 0.8–1 cm wide, slightly convex. Phyllaries 28–35 in 3–4 subequal series, lanceolate; phyllaries of first series 8.8–9.2 mm long, 2.5–3 mm wide, appressed, base indurate, sparsely velutinous, dark green, herbaceous part moderately to densely velutinous, dark green, glabrous adaxially, margins ciliate; phyllaries of second, third, and fourth series 1–1.2 cm long, 3–3.5 mm wide, appressed, herbaceous, moderately to densely velutinous, dark green, margins ciliate. Pales 7.9–8.3 mm long, 3.3–3.6 mm wide, lanceolate, conduplicate, strongly keeled, chartaceous to somewhat coriaceous, barely protruding beyond phyllaries, basal half of pale glabrous, stramineous, distal half moderately velutinous, dark green or blackish green, apex acuminate erect. Ray flowers 11–16; corollas golden-yellow; tube 2 mm long, minutely puberulent; ligule 1.8–2.5 cm long, 5–8 mm wide, oblong, spreading, sparsely to moderately puberulent and glandular abaxially, veins black on abaxial surface, apex acute to rounded, bifid; ray ovaries 3.2–3.7 mm long, cuneate, triquetrous, sparsely puberulent, eppapose or with 1–3 squamellae, 0.3–0.5 mm long. Disk flowers 90–140, flowers protruding 2 mm beyond pales; corollas golden-yellow, narrowly campanulate; tube 1.3–1.6 mm long, moderately puberulent; throat 4.8–5.4 mm long, 1.3–1.5 mm wide, veins orange, sparsely to moderately puberulent; lobes 1.3–1.7 mm long, deltate, black on abaxial surface, moderately puberulent to tomentose abaxially; anthers 2.8–3.2 mm long, thecae black, appendages 0.6 mm long, broadly ovate to suborbicular, yellow-orange; styles 5.8–6.2 mm long, yellow-orange, style branches 2–2.4 mm long, tapered with a short appendage. Achenes, 3.5–4 mm long, 1.2–1.6 mm wide, biconvex, obovate, black, sparsely to moderately sericeous; pappus of 2 awns and 5–8 squamellae, awns 2.5–3 mm long, purplish stramineous, persistent, subequal, squamellae 0.4–0.7 mm long, free, same color as awns, persistent. Chromosome number unknown.

Viguiera davilae shares with *V. bombycina* S. F. Blake, *V. grammatoglossa* DC., *V. hidalgoana* E. E. Schill. & Panero, and *V. purpusii* Brandege a similar

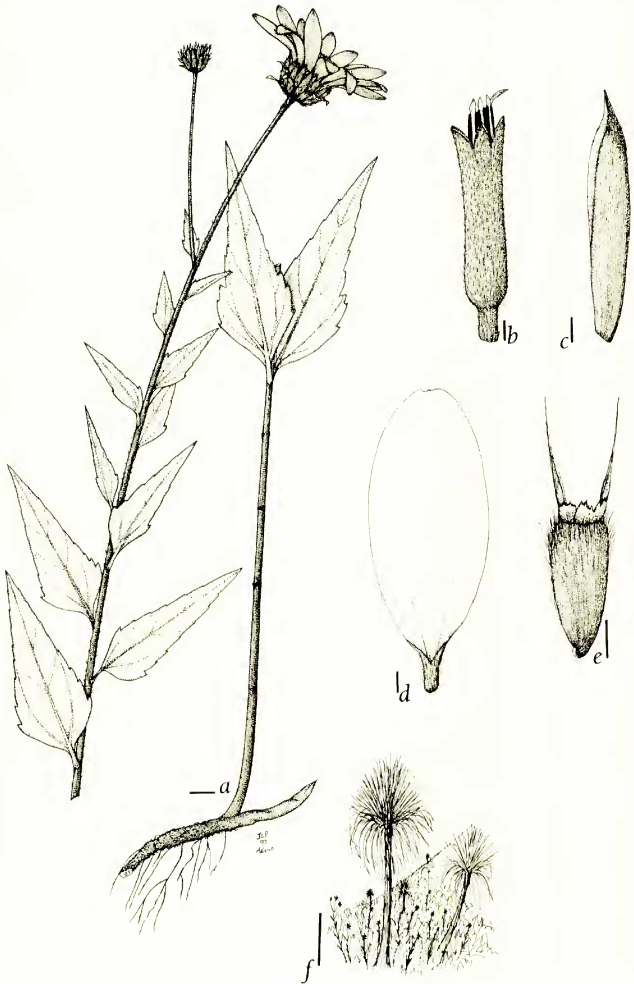


FIG. 9. *Viguiera davilae* (Panero, Dávila & Tenorio 2581). a. Flowering branch. b. Disk corolla. c. Pale. d. Ray corolla. e. Disk achene. f. Habit. (a, bar = 1 cm; b-e, bar = 1 mm; f, bar = 1 m.)

herbage pubescence, opposite leaves, a similar achene pappus morphology and color, and small capitulescences. *Viguiera davilae* can be readily distinguished from all these species by its lanceolate to trilobed leaves and the stoloniferous, herbaceous habit (unique, as far as known, among Mexican viguieras) that contrasts with the shrubby habit of the other species. Furthermore, *V. davilae* has appressed, lanceolate phyllaries, which are as long as or longer than the pales, a condition only observed in some populations of *V. grammatoglossa*.

Viguiera davilae appears to be a narrow endemic of the treeless gypsum hills of the Filo de La Tierra Colorada range north of Tehuacán. At the type locality, the species is abundant, growing in undisturbed oak shrubbery with *Perymenium mendezii* DC., *Tetrachyron brandegei* (Greenm.) Wussow & Urbatsch, *Tridax palmeri*, and *Nolina* sp.

The specific epithet honors our friend Patricia Dávila, chair of the Department of Botany, U.N.A.M.

ACKNOWLEDGMENTS

We thank John L. Strother for providing chromosome counts for several of the new species. We also thank Patricia Dávila for logistical support in the states of Puebla and Oaxaca, Mexico, and field assistance. Fieldwork for personnel of MEXU was supported by the Instituto de Biología and The MacArthur Foundation. JLP thanks Carmen Emilia Benítez de Rojas and Victor Manuel Badillo for field assistance and logistical support in Venezuela, and Socorro González and Saturnino Acevedo for field assistance and logistical support in Durango, Mexico. Fieldwork in Latin America for JLP was supported by NSF grant 91-14798. A Smithsonian Minority Fellowship to JLP to visit the US National Herbarium to study South American verbesinas is gratefully acknowledged. We are indebted to Christiane Anderson for providing the Latin diagnoses.

LITERATURE CITED

- Fay, J. J. 1978. Revision of *Perymenium* (Asteraceae-Heliantheae) in Mexico and Central America. *Allertonia* 1: 235-296.
- Panero, J. L. 1992. Systematics of *Pappobolus* (Asteraceae-Heliantheae). *Syst. Bot. Monogr.* 36: 1-195.
- Robinson, B. L., and J. M. Greenman. 1899. A synopsis of the genus *Verbesina*, with an analytical key to the species. *Proc. Amer. Acad. Arts* 34: 534-566.
- Robinson, H. 1979. A study of the genus *Schistocarpha* (Heliantheae: Asteraceae). *Smithsonian Contr. Bot.* 42: 1-20.
- . 1981. A revision of the tribal and subtribal limits of the (Heliantheae: Asteraceae). *Smithsonian Contr. Bot.* 51: 1-102.